

## Imparting Resilience Against Climate Change Through Sustainable Education and Indian Knowledge System

Mr. Girish Chandra Behera<sup>1</sup> & Miss. Pranati Priyadarshini<sup>2</sup>

<sup>1</sup>Assistant Professor in Odia (Teacher Education) Shailabala Women's Autonomous College, Cuttack

<sup>2</sup>Assistant Professor in Botany (Teacher Education) Shailabala Women's Autonomous College, Cuttack

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### Abstract

The term climate refers to the normal weather conditions of a particular region over a period of years. It is determined by a long-term pattern of oceanic and atmospheric conditions at a location. Our Earth consists of so many geographical regions. The major components of climate are temperature, air pressure, humidity, precipitation, sunshine, cloudiness, and winds averaged over a long period of time. There are different types of climates such as tropical climate, dry climate, mild climate, continental climate, and polar climate. So, climate studies are associated with geography, geology, zoology, meteorology, geophysics, and other subjects associated with the issues of climate formation and climate change. The change of climate in a particular region has an immense impact on other regions of the globe.

There are different adverse effects of climate change, such as heatwaves, droughts, floods, landslides, cyclones, forest fires, acid rain, global warming, depletion of the ozone layer and so on.

Proper education gives direction to human civilization. The aim of education is to promote sustainability and hospitable conditions to the life of every plant and creature in this world. As culture is the living form of human civilization we need to relate science with spiritualism to create motivation for caring and loving nature. As we dare to control nature and dominate other species, its result is dangerous and may threaten human existence on Earth. So, this article tries to discuss all the precautionary measures to safeguard the earth against the adverse effects of climate change. This article has tried to explore the cultural and spiritual significance of natural science to have positive concerns and a caring attitude on the global highway of sustainable development. So, we hope this article would be a good source of information connecting modern education to the traditional Indian knowledge system to satisfy the thirst for knowledge regarding all concerns of climate change.

**Keywords:** deforestation, resilience, global warming, emission

### Introduction

The term climate refers to the normal weather conditions of a particular region over a period of years. It is determined by a long-term pattern of oceanic and atmospheric conditions at a location. Our Earth consists of so many geographical regions. The major components of climate are temperature, air pressure, humidity, precipitation, sunshine, cloudiness, and winds averaged over a long period of time. There are different types of climates such as tropical climate, dry climate, mild climate, continental climate, and polar climate. So, climate studies are associated with geography, geology, zoology, meteorology, geophysics, and other subjects associated with the issues of climate formation and climate change. The change of climate in a particular region has an immense impact on other regions of the globe.

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## Objectives -

1. To understand the climate and its various issues.
2. To know the causes and effects of climate change
3. To discuss the role of education in promoting resilience against climate change.
4. To integrate science and the Indian knowledge system in serving nature and protecting our climate
5. To foster the cultural aspects of the worship of nature.
6. To discuss the adverse effects of atoms and missiles on climate.
7. To appeal for developing a sustainable lifestyle to protect the earth.

**Review of related literature** - (Healy & Mitchell, 2024) reported on Geography teachers' conceptions in climate change, sustainability, climate change education, and sustainability education. We want to analyse their concerns in the context of India's vision and mission for launching various programmes in climate change.

(Alan, 2019) focuses on climate change, education, research, problems and perils. We have made an attempt to introduce some traditional practices for respecting and worshipping nature in order to protect the earth against climate change.

(Mochizuki & Bryan, 2015) recognises that the education sector remains underutilised as a strategic resource to mitigate and adapt to climate change. Many countries have to develop a framework for climate change education. We have explored the role of educational stakeholders to work for preventing climate change both from scientific and cultural perspectives of climate change Education in our Indian environment.

ED.2010/WS/41,ED.2011/WS/3 of UNESCO Document, 2010 Climate change education for sustainable development: the UNESCO climate change initiative has elaborately discussed various activities of UNESCO in promoting sustainable education for climate change which includes international response to global warming, building of green society, energy conservation, youth empowerment and school education still it lacks the teaching and preaching of Indian knowledge system which has been included in this article.

(Læssøe, Schnack, Breiting, & Rolls, 2009) has thrown light upon recommendations, promising practices, climate change education, the role of research and researcher for sustainability and so on. Our motto is to focus on the Indian perspectives on global initiatives for protecting the climate.

**Causes and effects of climate change** - There are so many factors such as mining activities, industrial production, production of electricity, use of electric and electronic materials, lack of proper care of natural resources, atomic testing, use of missiles, and deforestation, which are responsible for climate change. A brief account of all those factors is discussed here under

1. **Mining and industrial activities** - According to research data of the UN, fossil fuels- coal, oil, and gas are the main factors of climate change. It causes 75 percent of greenhouse gas emissions and nearly 90 per cent of all carbon emissions. The emissions of greenhouse gases absorb the heat and cause global warming. Due to this global warming, intense heat is felt on Earth and disturbs normal living and working conditions. Sometimes it results in the form of sunstroke and other unstable climatic conditions. It causes the disruption of the natural balance on Earth.

On the other hand, the extraction of coal and natural gas from the earth creates empty spaces or holes in mines. It should be filled in with sand to avoid further natural accidents. But it is seen that the mining companies don't fill them with sand which would cause landslides in future.

When we try to produce electricity out of these coal, oil, or natural gas. It produces a large amount of smoke in the air. It also produces carbon dioxide and nitrous oxide which blanket the earth and absorb the heat. Besides the production of electricity, manufacturing industries release poisonous gases which cause air pollution. Industries like cement, steel, iron, plastic, clothes, electronics, etc, are factories which release the aforementioned poisonous gas and cause air pollution, leading to climate change.

2. **Deforestation and concretisation** - Once our earth was covered with forest. With the growing need of human civilization deforestation activities grew day by day. Cutting off forests became essential to create farms, fields, pastures, human buildings, roads and railways, towns and cities, industries, research laboratories, bus terminals, aerodromes and so on. This deforestation affects the climate in many ways due to the lack of enough trees. Natural rain has lost its balance; sometimes, it creates droughts and famine, and sometimes, it creates floods out of control. Sometimes it invites untimely rain and destroys the crops. Due to less production of water vapour, the natural cooling system is highly affected, and heat is intensified and unbearable for the entire ecosystem. Some living beings are extinct from Earth, such as the Dodo, Dinosaur, Passenger pigeon, woolly mammoth and plants like Calamites, Silphium, Glossopteris, etc.

3. **Transportation and electronic communication** - Transportation is a modern need of civilization. But the increasing number of vehicles on the roads and railways, water and space have adverse effects on climate change. The roadways - vehicles bike, cars, Jeep, vans, buses, trucks, and large containers use thousands of litres of fossil fuels and release carbon dioxide, carbon monoxide, nitrogen dioxide, nitrous oxide, hydrofluorocarbon, methane gases affecting our climate. Space pollution through a huge number of spacecraft is a new trend of climate change. Different space testing agencies send numerous artificial satellites and rockets for their space research and cannot return them all to Earth. Their floating existence in space causes emissions and space pollution, leading to climate change. Like this the electrical and electronic items starting from an electric bulb, to refrigerators and air coolers we produce different poisonous gases like Chlorofluorocarbon, hydrofluorocarbon which cause climate change and other health issues

4. **Use of plastic** - There are different kinds of plastic and plastic materials which pollute our soil, water, and air and never decompose themselves. They have adverse effects on the ecosystem both on living and non-living elements. Some of these plastic-producing pollutants are Polychlorinated biphenyls, Hexabromocyclododecane, Styrene oligomers, Bisphenol A, Polystyrene, DDT

5. **War affairs and climate change**- Atomic science has changed the face of human development towards destruction. In the current world scenario, thousands and thousands of missiles are thrown here and there in the war zone. These missiles and war weapons not only cause the loss of numerous invaluable lives but also cause climate change at large. Devastating and demolishing buildings produce different kinds of chemical dust. Missile tests create new threats to bios. Tests under the earth, in the sea, and in the air have adverse effects on the climate and ecosystem as well.

**Long-range missiles have long-range effects**

SL. No.	Missile	Maximum Range
1	Trident II (USA)	7 800 km
2	R-36M2 Voyevoda (Russia)	11000 Km
3	RS-24 Yars (Russia)	12000 Km
4	LGM-30G Minuteman III (USA)	13000 Km
5	R-29RMU2.1 Layner (Russia)	8300 Km
6	M51 (France)	10000 Km
7	DF-41 (China)	12000 Km
8	DF-31AG (China)	11200 Km
9	JL-3 (China)	12000 Km
10	Bulava (Russia)	9500 Km

(source-[https://www.jagranjosh.com/general-knowledge/list-of-top-10-intercontinental-ballistic-missiles-2022-1671455148-1#google\\_vignette](https://www.jagranjosh.com/general-knowledge/list-of-top-10-intercontinental-ballistic-missiles-2022-1671455148-1#google_vignette))

#### 6. Chemical fertilisers and their pollutants

The use of chemical fertilisers and pesticides in agriculture has a negative effect on climate. We may discuss some of these chemical fertilisers and their pollutants causing harm to human health and our ecosystem from the list given below

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SL.No	Fertiliser	Element Percentage			
		Nitrogen	Prosperous	Potash	Zinc
1	Urea	46	-	-	-
2	Calcium, Ammonium Nitrate	25	-	-	-
3	Ammonium Sulphate	20	-	-	-
4	Single Super Phosphate	-	16	60	-
5	Murate of Potash	-	-	-	-
6	Dy Ammonium Phosphate	18	46	15	-
7	N.P.K	15	15	16	-
8	N.P.K	12	32	-	-
9	N.P.(Complex)	20	20	-	-
10	Zinc Sulphate	-	-	-	21
11	Chilled Zinc	-	-	-	12

**A reflection of deforestation in India**

SL No.	State/ UT	Forest cover percentage as of 2019	No. of units in small-scale industries sector
1	Odisha	33.50	388277
2	Kerala	54.70	452826
3	Uttarakhand	45.44	106484

4	Delhi	13.5	177080
5	Jammu and Kashmir	39.15	73125
6	Madhya Pradesh	25.14	793552
7	Uttar Pradesh	6.15	1707977
8	West Bengal	18.96	771388
9	Gujarat	7.61	530314
10	Tamil Nadu	20.31	787965
11	Haryana	3.63	223294

The forest data has been derived from the PIB 2019 IFRS report. The Small-scale industries units data derived from MSME, Govt. of India

### **Role of education in promoting resilience against climate change**

Education is the strength of society. Education shows the right path in disastrous conditions. Modern education has rightly explored some new trends like education for sustainable development, education for waste management, education for disaster management, and education on environmental science, which are highly essential to cope with climate change and take appropriate initiatives to protect the ecosystem and save the earth. We can take a brief account of such education to develop the capacity of resilience against climate change in this paragraph.

Natural calamity is the friend of climate change. We should be ever ready to face those natural disasters and take appropriate measures to save our lives and property. The following precautions should be included in the curriculum at all levels of education to develop our resilience against climate change.

### **Safety measures during an earthquake**

- We should try to protect our heads under strong furniture or the strong beam over the door.
- We should check our fire sources and put them off.
- We should stay calm and still avoid moving and running.
- Lying on the bed with a pillow on head, remaining away from heavy objects.
- Stay far from buildings in open areas.
- Avoiding using lifts and elevators can protect us during and after earthquakes.

### **safety measures to fight against the storm**

- We should keep a torch with the cyclone information system through radio or smartphone if possible.
- We should live in low-lying areas and take shelter in storm-resistant buildings.

- We should keep in advance with us the following goods such as - Dry foods, drinking water, batteries and chargers, essential medicines, important documents and diaries, and baby supplies.

Disasters are many, so precautions are multifarious. As responsible citizens of the country, we should preserve enough food and other essential accessories with us not only to save us but also to help others during calamities. As a part of our social leadership, we should demand life-saving equipment, disaster shelter buildings, and the availability of trained rescue and relief operations teams, firefighters, and mechanical engineers in our locality.

### **Waste management education**

The concept of waste management education is a new trend in environmental education. With the changing needs of the time, it should be incorporated into the school and college curriculum as well. It should cover all the dimensions of waste management issues and challenges that are faced by the people at the current time. The specific curriculum should encourage fruitful content development for all the standards of schooling which may include

### **Wastage redressal mechanism related to science and technology**

1. Incinerator
2. Water filtration systems such as reverse osmosis, oil separator, solid bowl centrifuges
3. Different gas separation processes cryogenic distillation, adsorption, absorption, distillation
4. Industrial waste separation system
5. Space waste removal engineering
6. Biological waste removing mechanism
7. Renewals of metals and plastics

### **These mechanisms may be converted into different activities such as-**

1. Motivation for gathering and disposal of waste
2. Planning for imparting waste management education in all spheres
3. Creating leadership to ensure cleanliness to fulfil the objectives of waste management education.
4. Controlling the production of wastage and use of plastic.
5. Organising awareness camps for the generation of awareness regarding waste management
6. Monitoring the medical and industrial production units in setting up their waste managing/ disposing units
7. Supervising the officers and personnel deployed or engaged by the Govt to work for the waste management division.

So, management is a single word but not a single action. Management is broader accountability which combines the social responsibilities of different stakeholders of the society who are involved in controlling climate change in favour of the ecosystem.

### **Integrating science and Indian knowledge system for resolving climate issues**

It was an opinion of Dr APJ Abdul Kalam that to what extent we can see on the horizon is a science, and beyond that, spirituality starts. The Indian Knowledge system possesses numerous strong principles of science

which we cannot perceive due to our limited knowledge. Some religious practices and cultural ethics are discussed here to visualise the science of nature and our love for it in this paragraph.

1. Giri Govardhan Puja is celebrated on Balipratipada in the month of Kartik which falls on 2nd November in 2024. This festival engaged people to worship the hills and trees and is believed to have been started by lord Shri Krishna in the age of Dwapara. It develops our prime concern for the forest to realise its contribution to our lives. In science, it can be connected with the protection of cattle, forests, and environmental education.
2. Samudra aarti took place on Pausa Purnima to worship the sea, realising its contribution to the human community. It can be connected with the mission of a pollution-free ocean. Besides, Samudra arati is also performed at Jagannath Dham Puri in Odisha every evening.
3. Ganga aarti is performed at Haridwar, Rishikesh, and Varanasi by different monks and mathadhisa in India.
4. Akshaya Tritiya, which falls on the third tithi of the bright half, is the holy day to start farming on the land. It is a day to respect Mother Earth. All auspicious works are initiated on this day in the Hindu culture; however, it can be related to the protection of soil in environmental science.
5. Many harvesting festivals are observed in different cultures of India, such as Nuakhai in Odisha, Bihu in Assam, Pongal in Tamil Nadu, Baisakhi in Punjab and Sohrae in Santhal culture, which owes our gratitude to nature for good harvesting promoting the safe existence of life on earth. It also teaches us to adopt homemade natural food, avoiding the modern fast food borrowed from other cultures, which is unhygienic.
6. Bhoomi dahana is the third day of a festival of Odisha called Raja Parva, which usually falls on June 16, the next day of Raja Sankranti. On this day the women do not walk on bare feet. No work of digging or giving pain to soil is seen on this day. It shows our great concern to love and save the earth. It can be stated that a Sanskrit verse is recited every morning which utters-

Samudra vasane devi parbata sthana mandale I

Vishbupatni namastubhyan padasparshan khamaswame II

It means the earth is our mother. The Ocean is her clothes, the forest is her body, and the mountains are her chest. We are forbidden to touch first with our feet. We bow to her as the wife of lord Vishnu.

7. There are some specific days which invite rain onto the earth. Those days are Sheetala sasthi, which falls on the 6th day of the Shukla paksha in the month of jyestha. Raja Sankranti approximately June 15, Vasumati snan on the fourth day of Raja Parva, and Shri Krishna Janmashtami which comes on the eighth day of Bhadrava. It is believed that if those days experienced a little bit of rain, even some drops, there would be drought, and famine in those years. It is also believed that if a Sankranti gets rainfall, then there are chances of scattered rain throughout the month. We can relate these beliefs and practices to the modern meteorological sciences. Our long-term observation can experience that if the entire western sky becomes red in the last part of the afternoon, it symbolises an oceanic storm in the near future. This has been mentioned in Odia book 'Khana Bachana'. In addition to this, if the frogs croak, if flying termites are seen together, it symbolises continuous rain in the near future. So, nature



gives warning before all its forthcoming happenings which we should learn from the experience of our predecessors and try to prove them in science.

8. Different species naturally contribute to the ecological balance of the earth so different animals and birds are taken together with different Gods and Goddesses in the Hindu religion. It takes mouse with lord Ganesh, swan with Goddess Saraswati, Ox with lord Shiva, Lion with Goddess Durga, Garuda (a kind of eagle) with lord Vishnu, elephant and owl with Goddess Lakshmi, Snakes with lord Shiva, Monkey and bear with lord Ram, Peacock with lord Kartikeya and so on. If we analyse the family of lord Shiva, we can find a reflection of the food chain for the balance of the ecosystem where rat and snake, snake and peacock, ox and lion are living together to maintain the natural balance of the ecosystem.
9. Many plants and trees are worshipped being associated with different Gods, goddesses, and festivals of Hindu religion. Some of these invaluable plants are enlisted here under.

SL.No	Name of the plant	Associated with God or Goddess	Advantages
1	Tulsi or Basil	Lord Vishnu, Krishna and Ram	Anti-microbial, anti-inflammatory, anti-oxidant, anti-diabetic
2	Neem and sandalwood	Lord Jagannath	Neem Anti-bacterial, anti-fungal, anti-oxidant Sandalwood Antiseptic, anti-inflammatory, diuretic, anti-oxidant
3	Bael	Lord Shiva	Anti-inflammatory
4	Pomegranate	Devi Durga	Anti diabetic, anti-tumour
5	Ashok	Devi Sita	Can treat Gynaecological issues
6	Hibiscus	Devi Mangala	Antipyretic, anti-cancer
7	Coconut	Devi Tarini	Controls blood sugar, blood pressure, anti-diarrheal
8	Lotus	Devi Lakshmi	Treat diarrhoea, nervous disorders

9	Ashwattha or Sacred fig	Lord Sanischara	Astringent, anti-microbial treat vomiting, diarrhoea, dysentery, toothache
10	Kadamba or Burflower tree	Radha and Krishna	Anti-venom, anti-oxidant, anti-diabetic, anti-tumour, cure eye inflammation
11	Jasmine	Kama Deva	Anti-depressants, antiseptic, anti-oxidant, sedative
12	Pippal or Banyan	Lord Jagannath	Anti-inflammatory, anti-bacterial, cure diarrhoea

**Conclusion** - Life is a small entity of nature. Life and nature are interdependent. Climate is a small part of nature. So, if we try to understand the issues and concerns of climate change, it would motivate us to think for the earth at our level. A small change in the mindset of a leading individual may transform thousands of minds to work together for a common cause of the human race. As climate change is considered a serious global challenge, education for sustainable development is the only way to resolve this issue and reduce the worries of the whole world. Let us love nature and nurture the young generation to govern over their senses not to apply science against nature but rather remember the holy verse of the Indian rishis which recites-

Om Dyauha Shantirantariksham Shantih

Prthivi Shantir-Aapah Shantir-Ossadhayah Shantih |

Vanaspatayah Shantir-Vishvedevaah Shantir-Brahma Shantih

Sarvam Shantih Shantir-Eva Shantih Saa Maa Shantir-Edhi |

Om Shantih Shantih Shantih ||

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### **Authors self-declaration**

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